

REMARKS

Claims 15, 16, 22, 23 and 35 are amended. Claims 15-24 and 35-41 are pending in the application.

Claims 15-24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over various cited combinations of Sharan, U.S. Patent No. 5,747,116; Smith, U.S. Patent No. 6,277,733; Brown, U.S. Patent No. 5,780,359; and Stinnett, U.S. Patent No. 6,325,861. The Examiner is reminded by direction to MPEP § 2143 that a proper obviousness rejection has the following three requirements: 1) there must be some suggestion or motivation to modify or combine reference teachings; 2) there must be a reasonable expectation of success; and 3) the combined references must teach or suggest all of the claim limitations. Each of these three factors must be shown in order to establish a *prima facie* case of obviousness, the burden of which is upon the Office. Each of claims 15-24 are allowable over Sharan, Smith, Brown and Stinnett for at least the reason that the references, individually or as combined, fail to disclose or suggest each and every limitation in any of those claims, and fail to provide a basis for a reasonable expectation of success.

As amended, independent claim 15 recites etching to expose a silicon-comprising material at a base of an opening and utilizing an oxygen-comprising plasma to remove a residue from the outwardly exposed silicon-comprising material. The amendment to claim 15 is supported by the specification at, for example, page 8, line 18 through page 9, line 2. Sharan discloses forming a contact opening 18 to a node 14, with a thin layer of oxide being formed over the node (col. 3, ll. 59-63). Sharan further discloses utilizing hydrogen plasma or an NF₃ plasma to remove the layer of oxide from node 14 (col. 3, ll. 64-66).

Sharan does not disclose or suggest the claim 15 recited oxygen-comprising plasma or the recited utilization of an oxygen-comprising plasma to remove a residue from an outwardly exposed silicon comprising material.

The Examiner indicates at page 3 of the present Action, that Smith discloses an oxygen plasma and a cleanup step, relying on column 3, lines 36-38. The Examiner is mistaken. The Smith disclosure at column 3, lines 36-38 discloses removal of photoresist utilizing an oxygen ash followed by a cleanup step or alternatively by subjecting the wafer to a hydrogen containing plasma. Accordingly, Smith does not disclose or suggest the claim 15 recited oxygen-comprising plasma. Nor does Smith disclose or suggest utilizing a plasma to remove residue from an outwardly exposed silicon-comprising material. As combined with Sharan, Smith does not contribute toward the claim 15 recited utilizing an oxygen-comprising plasma to remove a residue from an outwardly exposed silicon comprising material.

As indicated at page 4 of the present Action, Brown is relied upon as showing a stripping process temperature of from 20 °C to over 100 °C. Stinnett discloses utilizing a pattern resist feature 20 during an etch process to extend a hole to expose an underlying metal layer 16 (col. 3, ll. 32-39). Stinnett further discloses that a cleaning step is then performed to remove etchant residue and resist from the metal layer prior to subsequent processing, the cleaning utilizing a halogen-substitute saturated hydrocarbon gas (col. 5, ll. 41-44, and col. 6, ll. 50-64). Accordingly, Stinnett does not disclose or suggest the claim 15 recited utilizing an oxygen comprising plasma or the claim 15 recited removal of a residue from an outwardly exposed silicon-comprising material. As combined with Sharan and Smith, neither Stinnett nor Brown contributes toward suggesting the claim 15 recited

utilizing an oxygen-comprising plasma to remove a residue from an outwardly exposed silicon-comprising material. Further, the various cited combinations of Smith, Sharan, Stinnett and Brown fail to provide a basis for a reasonable expectation of achieving the claim 15 recited removing a residue from an outwardly exposed silicon-comprising material utilizing an oxygen comprising plasma. Accordingly, a *prima facie* case has not been established and independent claim 15 is allowable over the cited combinations of Stinnett, Brown, Sharan and Smith.

Claims 16, 22 and 23 are amended to properly depend from independent claim 15. Dependent claims 16-24 are allowable over the various cited combinations of Sharan, Smith, Stinnett and Brown for at least the reason that they depend from allowable base claim 15.

Claims 35-41 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sharan and Stinnett, or over the combination of Sharan and Stinnett in further view of Brown. As amended, independent claim 35 recites dry etching a BPSG layer to expose a silicon-comprising substrate material at the base of an opening, and plasma etching to remove a carbon-containing polymer residue from the silicon-comprising material substantially selectively relative to BPSG and the silicon-comprising substrate material. The amendment to claim 35 is supported by the specification at, for example, page 6, lines 10-11 and page 6, lines 21-22. Sharan does not disclose or suggest the claim 35 recited forming a carbon-containing polymer residue at least partially over a silicon-comprising substrate material at the base of an opening. Nor does Sharan disclose or suggest the claim 35 recited plasma etching the carbon-containing polymer residue substantially selectively relative to BPSG and the silicon-comprising substrate material.

Neither Brown nor Stinnett contribute toward suggesting the claim 35 recited plasma etching a carbon-containing polymer residue from a silicon-comprising substrate material, the etching being substantially selective relative to BPSG and relative to silicon-comprising substrate material. Further, as combined, Sharan, Brown and Stinnett fail to provide a reasonable expectation of achieving the claim 35 recited substantially selective plasma etching of a carbon-containing polymer residue relative to BPSG and relative to silicon-comprising substrate material. Accordingly, independent claim 35 is not rendered obvious by the cited combination of Sharan, Stinnett and Brown and is allowable over these references.

Dependent claims 36-41 are allowable over the cited combinations of Sharan, Stinnett and Brown for at least the reason that they depend from allowable base claim 35.

For the reasons discussed above, pending claims 15-24 and 35-41 are allowable. Accordingly, applicant respectfully requests formal allowance of such pending claims in the Examiner's next action.

Respectfully submitted,

Dated: October 27, 2003

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